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DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

Cases of fatal hydrophobia in man in the absence of injuries and contact with rabid animals or animals suspected of rabies.

by M. Nikolic.

Translated from: Archiv f. Hygiene und Bakteriologie,
136: 80-84 (1952).

During the past 3 years our institute has received anamneses of persons who had died of hydrophobia, nearly one third of which indicate that neither the patient nor his environment were exposed to injury or contact with a rabid animal or one suspected of harboring rabies. This circumstance induced me to reexamine earlier histories and to devote greater attention to similar cases of recent origin. I compiled a total of 35 such cases (9 from the years 1933-1939 and 26 since 1 June 1946). A centralized system of antirabic control has been adopted in Yugoslavia, and all phases of this service are subordinated to the Pasteur Institute at Novi Sad.

We must ask ourselves whether such an occurrence is possible. Thorough physical examinations were made in many cases, but no traces of injuries were found.

In the analysis of such cases, we must consider all factors involved.

The first postulation: The patients had denied injuries. This is quite improbable in view of the lack of motivation. All patients discussed here died in hospitals, and since they had sought medical assistance on their own, it would be illogical to deny something that is neither immoral nor criminal. The patient is frequently asked why he did not report for treatment in time, and the logical reply intimates that he was unaware of the need for treatment.

The second postulation: They had forgotten the injury. Injuries afflicted by an animal are not a daily occurrence that is easily forgotten. Each patient is asked during admission to our antirabic institutes, whether he had been bitten previously. Every patient answers precisely; what is more, he even remembers the month several years or decades ago when he was bitten.

Forgetfulness and inattention could be assumed in the case of children. The aforesaid cases included only 9 children aged 8-15, all others were older, up to age 60. Children between 8 and 15 years of age are not too young to remember such an event and, besides, their parents and their environment are accessible. For example, a 13-year-old boy remembered being bitten by a snake 5 years ago. Having recalled this event, he probably could remember subsequent happenings.

Relative to forgetfulness, a very long incubation period could also be assumed, possibly covering several decades, since some cases of hydrophobia erupted after certain bodily shocks such as sudden jumps into water, birth, etc. I am convinced of long incubations, but they may occur only as an exception and certainly not in a large number of cases. During my occupation with hydrophobia, I have learned of only one prolonged incubation of 707 days in a patient treated for rabies.

The third possibility: Unnoticed, direct contact with the rabid animal. This is theoretically possible, but subsequent investigations confirmed only a single case of proximity to a rabid animal. There was a suspected dog on the neighboring farm, but the patient did not come in direct contact with it.

The fourth postulation: Indirect contact with the saliva of a rabid animal. The literature contains three such cases. Aurelianus, in 200 A.D., described a person who infected himself during the mending of clothes torn by a rabid dog, and an identical case occurred about 1,700 years later at a Viennese clinic. (Kraus-Gerlach-Schweinburg). The third case, described by Kozewaloff, involved indirect transmission of infected saliva via a consistently healthy cat. The possible existence of additional cases of this type is not essential for the discussion of this question, since these cases referred to in the literature attest to the presence of a rabid animal.

The fifth possibility: Droplet infection. Huebner and Pelser described 9 cases of alleged psychogenic abortive rabies in persons nursing hydrophobic patients and being spit upon by them. In my opinion, these 9 cases do not represent psychogenic abortive rabies, but are either psychogenic sequels of antirabic vaccinations or the outcome of a previous neurotic disorder. Loewenberg's case is frequently quoted, in which a veterinary was coughed upon by a rabid dog and fell ill with ascending paralysis 5½ months after antirabic treatment, recovering 8 months later. Some investigators class this case with abortive street rabies on the basis of rather questionable results of liquor transmission to rabbits (Fedoroff), others consider it a neurocomplication following antirabic vaccination. I feel justified in claiming that this case has no connection either with the first group or the second, but that a coincidence is involved here.

Sixth postulation: Insects. Rabies as a human and animal disease has been known to man in its details for thousands of years. Although insects have been considered for some time, their participation has not been confirmed. To my knowledge, only Remlinger and Bailly have achieved fairly uncertain positive results in their experiments with transmission of the blood contained in the digestive tract of ticks. A rabbit contracted street rabies during the first test, as did all subsequent animals in additional passages; the dog from which the ticks had been collected, was infected with fixed virus, however. The authors conclude that this dog had been brought to the institute while already in the incubation stage of street rabies. In the second test,

only one guinea pig was infected, with an incubation time of 149 days (a rather protracted incubation for a guinea pig). Thirty additional tests failed to infect a single passage animal.

I have undertaken similar experiments, not with rabies, but with the related disease of pseudorabies, in which the blood is more infectious than in rabies. Transmissive attempts were completely negative.

A case described by Remlinger and Bailly is significant for the investigation of such tragic afflictions: A group of farmers who were attacked by a wolf, reported for antirabic vaccination. Two of them claimed to be uninjured, even free of salivary contamination; they had merely felt the wolf's breath on their faces. One can understand why they were excluded from treatment --- all of us would act similarly ---, but both men died of hydrophobia with incubations of 30 and 40 days.

Piringer published a case of two fancy dogs, one of which was in the incubation stage, the other was healthy. Both were led by chains, giving them an opportunity to sniff each other's genitals for a few seconds. The healthy dog subsequently fell ill with rabies.

The three authors mentioned above admitted the possibility of a droplet infection. Remlinger and Bailly used an apparatus to spray the air of a closed room with virus of the streets. Eight of the 26 laboratory animals present died of rabies. Piringer experimented with 110 animals and tried to infect via the unimpaired mucous membrane; of this number, a total of 6 animals were infected: One by oral infection and five by deep instillation of virus in the nasal cavity. Earlier investigators, including Galtier and Hoegys, successfully infected animals via the unimpaired mucous membranes.

The latter type of infection may also be assumed to occur in nature, but these are direct transmissions where only the path of transmission is different. My cases could also involve a similar, unnoticed type of infection, but, as already stated, it was impossible to establish the presence of a rabid animal in the patient's close proximity during the time period corresponding to incubation.

Recently, Deshmukh presupposed the possibility of an alimentary infection in two fatal cases of human hydrophobia, in which a direct or indirect infection was ruled out. The part of Calcutta inhabited by the two deceased laborers had not recorded a single case of rabies, leading the author to assume that the city water supply had somehow become contaminated with the saliva of a rabid animal. This hypothesis is not very promising, at least not by current standards. Alimentary infection requires a far greater viral concentration than a few cc diluted in the enormous amount of water carried in water mains.

Decroix attempted to induce an alimentary infection in himself; he consumed meat and saliva from a rabid animal's cadaver without the slightest effect.

Remlinger has recently called attention to rats which might be the reservoir and vector of the rabies virus; he cites Torres Kanel, who ascribes to the rat the role of rabies virus vector in Spain to the same extent attributed elsewhere to wolves and foxes.

It is beyond question that the rat may infect itself with rabies, becomes ill and could transfer the disease to man by biting (Jonnesco and others); it remains to be clarified whether the virus can be transmitted from the rat to man by means other than the bite, and if so, in what manner this takes place. It is probable, for example, in the case of pseudorabies, that the rat is the vector of the virus; this would readily explain the subsequent cycle of transmission: Other animals simply eat the rat and infect themselves in this manner, but how could a similar mode be applied to human hydrophobia?

A canine epizootic described by Lentze is important for the investigation of these enigmatic cases: A retired major was engaged in the breeding of miniature poodles. On one occasion there were 60 miniature poodles in the enclosed park of the estate, under their keepers' supervision, when a suspected, strange dog appeared among them. According to the keepers, not one poodle was bitten. The dogs were bathed, dried under fans and examined for insects by the owner, who was unable to find a single trace of injuries. Some time later the dogs came down with tarry diarrhea, the intestinal form of rabies. The sixth dog to fall sick revealed microscopic and biological signs of rabies. All dogs were destroyed except 20 that had been vaccinated against rabies with official permission.

The literature refers to earlier observations of occasional fatal hydrophobia without the involvement of bites or contact with rabid animals (Busson). Particular interest is offered by a fatal outcome involving a physician, as described by Glusmann, and the case of a veterinary assistant reported by Rooyen and Rhodes, since these deal with highly educated persons to whom forgetfulness, carelessness and unnoticed contacts, etc., cannot be attributed.

Hurst and Pawan, followed by others, were unable to establish an injury in the anamnesis of every person during their research of epidemic rabies on the island of Trinidad, and therefore assumed that vampires had inflicted bites while the persons were asleep. However, I believe this to be mere conjecture in the absence of other explanations.